

## NESTING CONTAINERS AND LIDS

BACKGROUND OF THE INVENTION1. Field of Invention

**[0001]** This invention relates to containers with lids.

2. Description of Related Art

**[0002]** Various types of lidded containers are known. Lidded containers are often sold in sets, and often each container of a set is of a different size such that the containers “nest” together, i.e., the smallest container fits inside the next-largest container, which in turn fits inside the next-largest container, and so on.

SUMMARY OF THE INVENTION

**[0003]** In such sets of containers, various problems are associated with management and storage of the lids. For example, the lids typically are stored separately from the containers, and often become lost. Additionally, when a particular lid is desired, the user must sort through the supply of lids to find the appropriate lid, which is troublesome.

**[0004]** This invention addresses these problems, and provides other advantages, by providing a container structure in which, when the container is not in use, the lid attaches to a bottom of the container.

**[0005]** In embodiments, the outside surface of the bottom of the container includes an attachment mechanism that attaches to a complementary attachment mechanism provided on an inside surface of the lid.

**[0006]** The outside surface of the lid may also include an attachment mechanism so that the lid may be attached to the container bottom in an inverted state. This inverted state of attachment is advantageous when, for example, the container and lid are placed together in a dishwasher for washing. The inverted state of attachment is also advantageous when, for example, multiple containers in an in-use state (e.g., a state of being filled with a food or other product) are stacked, one on top of another. In this state, the attachment mechanism of the bottom of the container on top may attach to the complementary attachment mechanism of the outside surface of the lid of the container below.

**[0007]** The attachment mechanisms may include a plurality of attachment projections. The attachment projections of the lid may be angled toward the attachment portions of the container to provide a reliable engagement between the attachment projections of the lid may be angled toward the attachment portions of the container.

**[0008]** These and other objects, advantages and salient features of the invention are described in or apparent from the following detailed description of exemplary embodiments.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0009]** Exemplary embodiments of the invention will be described with reference to the following drawings, wherein like numerals represent like parts, and wherein:

Fig. 1 is an oblique view of a first exemplary container according to the invention;

Fig. 2 is an oblique view of the container of Fig. 1 with a lid attached to the top thereof;

Fig. 3 is an oblique view of the container of Fig. 1 with the lid attached to the bottom surface thereof in an inverted state;

Fig. 4 is an oblique view of the container of Fig. 1 with the lid attached to the bottom surface thereof in a nested state;

Fig. 5 shows a cross section of a second exemplary container according to the invention with a lid attached to the bottom surface thereof in a nested state; and

Fig. 6 shows a cross section of a plurality of containers and lids according to the invention, in a nested state.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

**[0010]** This invention provides container lids that attach to an outside surface of a container bottom.

**[0011]** Fig. 1 shows a container 100. The container is shown having a round shape in plan view, but any other desired shape, such as rectangular, square, triangular, pentagonal, etc. is also acceptable. The container 100 will typically be formed of plastic material.

**[0012]** The container 100 may include a ridge 120 provided around the outer periphery near a top edge of the container 100. The ridge 120 reinforces the upper edge of the container 100 for greater strength and rigidity. The ridge 120 also facilitates closing of a lid, described below, onto the top edge of the container 100 by providing a structure for a user's fingers to anchor against while pressing the lid into sealing connection with the top edge of the container 100.

**[0013]** Several notches 122 are preferably provided in the ridge 120. The notches 122 allow the user's fingers easy access to the lid in order to remove the lid. The notches 122 also provide the advantage of allowing the outer circumference of the lid to be free of any protrusions such as are often present on prior art lids to provide a gripping ledge for a user's fingers. This facilitates nesting of the lids inside other containers, as described in more detail below.

**[0014]** The container 100 may also include one or more windows 124. In the embodiment shown in Fig. 1, the windows 124 are formed as concave surfaces in the wall of the container 100. However, any other desired configuration of the windows 124, such as flat, convex, etc., is also acceptable. When the container 100 is formed of molded clear plastic, the transparency of the plastic may be reduced by slightly roughening the surfaces of the mold. The windows 124 may be made by, for example, polishing or grinding the corresponding portions of the mold very smooth relative to surrounding portions so that the resulting portions of the container 100 corresponding to the windows 124 are correspondingly smooth. This results in greater transparency at the windows 124 relative to the other portions of the container 100. Therefore, the contents of the container 100 may be viewed without removing the lid.

**[0015]** As shown in Fig. 2, a lid 200 is provided that is sized and shaped such that its inner periphery engages the outer periphery of the top edge of the container 100 to effect a sealing relationship between the container 100 and the lid 200. The inside surface of the lid 200 includes an attachment mechanism, described in more detail below, that engages a corresponding attachment mechanism provided on a bottom surface of the container 100, also described in more detail below. The outside surface of the lid 200 may also include an attachment mechanism that engages the engagement mechanism on the bottom surface of the container 100. In Fig. 2, the attachment mechanism on the outside surface of the lid 200 includes four attachment projections 212. The attachment projections 212 are arcuate in shape, and together approximately define a circle.

**[0016]** As shown in Fig. 3, the attachment mechanism provided on the bottom surface of the container 100 includes a plurality of attachment projections 110. The attachment projections 110 correspond in shape to the attachment projections 212 on the outside surface of the lid 200. The attachment projections 212 frictionally engage the attachment projections 110 so that the lid 200 may be retained on the bottom of the container 100 in an inverted state.

**[0017]** Advantages of allowing the lid 200 to attach to the container 100 in an inverted state as shown in Fig. 3 include (1) the fact that, when placed in a dishwasher to be washed, the interior surfaces of both the container 100 and the lid 200 face outward and thus are better subjected to the cleaning action of the dishwasher; (2) the fact that, when a plurality of containers 100 and lids 200 are used, each being filled with a food or other product, the lid 100 of one container 200 may engage with the bottom surface of another container, thus locking the containers 100 and lids 200 together in a stacked relationship for easier carrying

or the like; and (3) the fact that a container 100, particularly a small container 100, may be locked to its own lid 200 or the lid 200 of a larger container 100 in an inverted relationship for greater stability while being used as, for example, a serving dish.

**[0018]** As shown in Fig. 4, the lid 200 also is attachable to the bottom surface of the container 100 in a non-inverted state, hereafter called a nesting state. Specifically, as shown in Fig. 5, which shows a cross section of a second exemplary embodiment, attachment projections 210 are provided on an inside surface of the lid 200 and frictionally engage the attachment projections 110 provided on the bottom surface of the container 100.

**[0019]** In the embodiment shown in Fig. 5, rather than a single set of each of the attachment projections 110, 210 and 212, two sets of each are provided, respectively approximately defining concentric circles. While the extra sets of the attachment projections 110, 210 and 212 are not essential, they may provide advantages such as more secure attachment of the lid 100 to the container 100. A further advantage of the second set of attachment projections 212, in particular, is that the base of a small container may be attached to the lid of a large container, as described in more detail below.

**[0020]** As shown in Fig. 5, the attachment projections 110 on the base of the container 100 angle outward from the base of the container 100 away from the center of the container 100, and the attachment projections 210 and 212 on the lid 200 angle inward from a top surface of the lid 200 toward the center of the lid 200. This configuration allows more secure attachment of the lid 200 to the container 100.

**[0021]** In Fig. 5, it can be seen that inward-facing sides of the attachment projections 210 and 212 of the lid 200 engage outward-facing sides of the attachment projections 110 of the base of the container 100. In contrast, in Fig. 3, outward-facing sides of the attachment projections 212 are shown as engaging the inward-facing sides of the attachment projections 110. It should be appreciated that either arrangement is acceptable. However, it will also be appreciated that, when the attachment projections 110, 210 and 212 are angled as shown in Fig. 5 and described above, the direction of the angle should be reversed if the outward-facing sides of the attachment projections 210 and/or 212 are to engage the inward-facing sides of the attachment projections 110.

**[0022]** It should also be appreciated that, while the attachment projections 110, 210 and 212 have been described above as having an arcuate shape and approximately defining circles, many other shapes and configurations are possible. For example, the attachment projections 110, 210 and 212 may have a linear shape, with the attachment projections 110 on the bottom of the container 100 approximately defining a square, triangle, pentagon, hexagon,

octagon or the like, and the attachment projections 210 and 212 on the lid 200 approximately defining corresponding squares, triangles, pentagons, hexagons, octagons or the like.

**[0023]** Additionally, although the attachment mechanisms described above have each included a plurality of attachment projections 110, 210 or 212, it should be appreciated that each attachment mechanism alternatively may have only a single attachment projection, e.g., a continuous annular projection or the like. However, it is usually preferable for the attachment mechanism to include more than one attachment projection, for the following reasons.

**[0024]** First, if a single attachment projection is provided in the form of a continuous circle or the like, a “pool” will be formed by the attachment projection when the container 100 or lid 200 is, for example, placed upside down in a dishwasher. Water will collect in this “pool” during washing, which is annoying to a user who subsequently removes the container 100 or lid 200 from the dishwasher. In contrast, when a plurality of attachment projections are formed, as illustrated in the embodiments described above, a notch is formed between adjacent ones of the attachment projections 110, 210 or 212. The notches allow water to escape, thus preventing ponding during washing.

**[0025]** Second, having a plurality of attachment projections 110, 210 or 212 allows the projections to deflect more resiliently and thus more easily engage opposing attachment projections 110, 210 or 212.

**[0026]** Fig. 6 shows a cross section of a plurality of containers 100-105 nested together. Each container 100-105 has a corresponding lid 200, 201, 202, 203, 204 or 205 attached to its base in a nesting state by engagement of the attachment projections 110 with the attachment projections 210. To enable connection between the base of one of the containers 200-205 and the lid 200, 201, 202, 203, 204 or 205 of one or more of the other containers 200-205, the containers 100-105 and lids 200-205 have, insofar as is practical, the same configuration of the attachment projections 110, 210 or 212. For example, as shown in Fig. 6, the attachment projections 110 of container 100 are identical in shape and position to the attachment projections 110 of containers 101, 102 and 103, and the attachment projections 110 of container 105 are identical in shape and position to the attachment projections 110 of container 106.

**[0027]** There are practical limits to making the attachment projections of each container have the same position, for the following reason. As can be appreciated from the drawings, each container 100-105 rests on the attachment projections 110 when placed on a horizontal surface. If attachment projections 110 are spaced too closely together on the base

of the container 100, 101, 102, 103, 104 or 105 relative to the width of the base of the container, the container may not be sufficiently stable. On the other hand, in the case of the smaller containers in a set, e.g., containers 105 and 106, the attachment projections 110 clearly cannot be spaced wider than the maximum width of the base of the container.

**[0028]** Accordingly, a suitable spacing width is selected for the attachment projections 110 on the largest container in a set, e.g., container 100, and this spacing is maintained for each successively smaller container until such a spacing would no longer practically fit on the base of the container. Thus, for example, in Fig. 6, the spacing of the attachment projections 110 on container 100 is maintained for containers 101-103, but would not fit on containers 104 and 105; therefore, a narrower spacing is used for containers 104 and 105. An example of a suitable width of the spacing of the attachment projections 110 of the largest container 200 is greater than or equal to about one half of the width of base of the largest container 200.

**[0029]** As shown in Fig. 6, the heights of the containers 100-105 are preferably selected such that, when the containers 100-105 are nested as shown, none of the top edges of containers 101-105 protrude above the plane of the top edge of container 100. This allows the lid 200 to be placed on the top of the container 100 with all of the other containers 101-105 stored inside the container 100.

**[0030]** In Figs. 5 and 6, on each of the lids 100-105, the attachment projections 210 on the inside surface of the lid are located at positions exactly opposite the positions of the attachment projections 212 on the outside surface of the lid. However, it is also acceptable for the attachment projections 210 on the inside surface of the lid to not be located at positions exactly opposite the positions of the attachment projections 212 on the other side of the lid. For example, the attachment projections 212 on the outside surface of the lid may approximately define a circle smaller than the circle approximately defined by the attachment projections 210 on the inside surface of the lid, and thus not be located exactly opposite the attachment projections 210.

**[0031]** Considering the containers 100-105 in Fig. 6, it can be appreciated that, when the containers 100-105 are in use, with the lids 100-205 attached respectively to the top edges of the containers 100-105, the bottom surfaces of only containers 101-104 can attach to the outer surface of the lid 200, the bottom surfaces of only containers 100 and 102-104 can attach to the outer surface of the lid 201, etc. Similarly, the bottom surface of only container 106 can attach to the outer surface of the lid 205, and the bottom surface of only container 105 can attach to the outer surface of the lid 206. However, if more than one set of

attachment projections 212 are provided on at least the larger ones of the lids, e.g., lids 200-204, as shown in Fig. 5, greater flexibility can result. Specifically, for example, if the lid 200 has two sets of attachment projections 212 as shown in Fig. 5, and if the inner set of attachment projections 212 match with the attachment projections 110 of the container 105 and/or 105, then the container 105 and/or 106 can also be attached to the lid 200.

**[0032]** Allowing the lids and containers to interchangeably interconnect as described above is particularly advantageous when, for example, multiple containers in an in-use state (e.g., a state of being filled with a food or other product) are stacked, one on top of another. In this state, the attachment mechanism of the bottom of the container on top may attach to the complementary attachment mechanism of the outside surface of the lid of the container below. For example, if the user is attending a party and taking chips in the container 100 and salsa in the container 104 or 106, the user may stack the closed container 104 or 106 on the lid 200 of the closed container 100. Since the respective attachment mechanisms mutually engage as described above, the user may easily carry both containers in one hand without fear of the top container sliding off of the bottom container.

**[0033]** While the invention has been described in conjunction with the specific embodiments described above, many equivalent alternatives, modifications and variations may become apparent to those skilled in the art once given this disclosure. Accordingly, the exemplary embodiments of the invention as set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the spirit and scope of the invention.